Watershed Advisory Group

TO: Daniel Cooper
FROM: Rick Rollins, Watershed Advisory Group
DATE: 17 February 2005
SUBJECT: Draft BAT Table on December 2004 Draft Industrial Storm Water Permit

As requested, I have reviewed the December 2004 Draft Industrial Storm Water Permit (Proposed Permit). This outline presents Watershed Advisory Group's comments concerning numerical discharge limits that could be included as performance standards for industrial SW discharges.

1. Introduction

   This table represents numerical effluent limits for the quality of storm water discharged from industrial sites based upon a 25 year 24 hour rain event (Phosphate Subcategory, Fertilizer Manufacturing Point Source 40 CFR 418.10). That is, all storm water discharged from a site resulting from a storm or series of storms not exceeding the 25 year 24 hour rain event depth for the location shall be treated to a level at or below the limits in the table below before discharge. Discharges shall be monitored (sampled, analyzed, and reported) for the duration of the discharge. Events exceeding the 25 year 24 hr storm shall be sampled, analyzed, and reported but the limit may not be enforced if the measured rainfall at the site is demonstrated to be more than the 25 yr 24 hr storm event.

2. Alternatives to BAT discharge levels

   Assuming that dischargers can demonstrate that the quality of storm water leaving the facility is adequate to meet the applicable limits, limits may be met by isolating sources of contamination from storm water by fully enclosing the industrial process and storage of raw and finished materials. Indeed, this may be the only way to meet BAT with pollutants such as petroleum coke which is easily carried off of piles as small particles entrained in wind.

   Further, if groundwater contamination is not an issue, discharges may be avoided by infiltration. This is allowed, for instance, in the Lahontan storm water permits which also have requirements for quality of water discharged to land (infiltration). In instances where treatment is required to reach the suggested BAT levels, a preferable approach may be to store and reuse storm water in manufacturing processes, irrigation water, or dust control. This would be acceptable as long as any water draining to surface waters met BAT levels.

3. Treatment to reach BAT discharge levels

   If dischargers do not have available space for treatment ponds or wetlands, treatment system components can be arrayed in series such as a hydrodynamic "swirl" concentrator followed by a media filter to meet discharge standards.

4. BAT discharge limits compared with CTR

   Generally, the notes below the Table explain the source of each Proposed BAT limit or Alternative Proposed BAT limit. In addition, the USEPA benchmarks and CTR limits are given to provide some perspective on the proposed BAT levels. CTR levels are stated in the Federal Register as the "dissolved" fraction of each heavy metal in the receiving water. While the proposed BAT levels may be greater than the CTR levels, the given BAT limits are the levels currently being achieved by common treatment methods for storm water.

   The fraction of dissolved metals in an effluent meeting these proposed BAT levels could be lower than the corresponding CTR level, but limiting the total mass of pollutants discharged from industrial sources is important because the biology and chemistry of receiving waters and sediments may make the toxic pollutants in suspended solids more bioavailable than they are when measured at the industrial discharger's outfall.

5. Sources of BAT discharge levels

   As indicated in the "notes" section below the Table, BAT levels were extracted from Subchapter N sections concerning storm water for industries where EPA has promulgated effluent guidelines, other states permits with numerical limits, California Regional Board permits where numeric limits have been used for some years, and from the International Stormwater Best Management Practices (BMP) Database (IBMPDB) a copy of which will be provided with this comment. The original IBMPDB can be accessed on the internet at http://www.bmpdatabase.org/. The IBMPDB provides analytical results from over 1600 systems treating urban runoff that have been collected under a specified protocol and validated by the IBMPDB sponsors. Systems evaluated include hydrodynamic devices, biofilters, detention basins, media filters, wetland basins, grassy swales, as well as others not listed here.

   The International Stormwater Best Management Practices (BMP) Database project, which began in 1996 under a cooperative agreement between the American Society of Civil Engineers (ASCE) and the U.S. Environmental Protections Agency (USEPA), now has support and funding from a broad coalition of partners including the Water Environment Research Foundation (WERF), ASCE Environmental and Water Resources Institute (EWRI), USEPA, Federal Highway Administration (FHWA) and the American Public Works Association (APWA). Wright Water Engineers, Inc. and GeoSyntec Consultants are the entities maintaining and operating the database clearinghouse and web page, answering questions, conducting analyses of newly submitted BMP data, conducting updated performance evaluations of the overall data set, disseminating project findings, and expanding the database to include other approaches such as Low Impact Development techniques. The database itself is downloadable to any individual or organization that would like to conduct its own assessments.

   In order to evaluate the database contents for Proposed BAT levels, the database was sorted

to find examples of BMPs where a subject pollutant (such as copper, suspended solids, COD, etc.) could be examined. Of the available examples for each pollutant only those with a positive statistically significant difference between the effluent and influent event mean concentrations (ln transformed) were used. This was interpreted as meaning that the treatment method was providing a statistically significant level of pollutant removal. The purpose of this measure was to not include examples where a pollutant was absent in the influent which would produce an artificially low effluent level for that pollutant.

The natural log transformed values were checked because water quality concentrations usually conform to log normal distributions more accurately than to normal distributions using standard arithmetic or "raw" data. In fact the both the log transformed and untransformed arithmetic averages of the effluent concentrations were quite close to each other in all the cases evaluated. The average was used to provide a preliminary BAT level instead of some lower percentile level because the lower percentiles were felt to be too difficult to meet for an initial regulatory effort. The final BAT level was reached by rounding up to the nearest multiple of 5. In the future, if these BAT levels are found to be inadequately protective of the receiving water and more experience with different treatment methods is documented, the levels can be lowered.

6. Conclusion

The Table of Suggested BAT levels below proposes to initiate a performance based program of general industrial storm water permitting which would include specific numeric limits that dischargers would need to meet to comply with their permit discharge requirements. Sampling and reports of the analytical results would be the first-cut basis for determining compliance.

Based on Watershed Advisory Group's previous presentations to the Board, this system of numeric limit permitting would be more likely to reduce the concentration of pollutants introduced into the surface waters of California than the current non-numeric process based permit.

7. Table of Suggested BAT levels

Item	Parameter	Proposed BAT	Benchmark	CTR (see note 10)	Rationale	Alt. Prop. BAT	Alt. Rationale
1.	T. Phosphorus	2.0 mg/L	2 mg/L	na	Benchmark, see also See notes 1,2, and 11	0.1 mg/L	Lahontan NPDES permit CAG616003
2.	T. Suspended Solids	50 mg/L	100 mg/L	na (Lahontan Basin Plan has limits for turbidity, 20 NTU)	Coal Pile Runoff associated with Steam Electric Power Generating Point Source, 40 CFR 423	25 mg/L 30 day average, 45 mg/L 7 day average; 25 mg/L (IBMPDB, See note 6)	Best Practicable Technology, Colorado Sand and Gravel Discharge Permit Number Cog-500000 See note 3
3.	Total Nitrogen	10 mg/L	na	na	Drinking water standard; See also notes 1,2, and 12		
4.	Total Copper	15 ug/L	63.6 ug/L	3.1 ug/L salt water continuous	See note 5	10 ug/L	See note 2
5.	Total Lead	15 ug/L	81.6 ug/L	2.5 ug/L fresh water continuous	see note 9		
6.	Total Zinc	110 ug/L	117 ug/L	81 ug/L salt water continuous	see Note 4	55 ug/L, 60 ug/L	See note 2, See note 7
7.	Oil and Grease	10 mg/L	15 mg/L	na	State Effluent Regulations, Colorado Sand and Gravel Discharge Permit Number Cog-500000 See note 3		
8.	BOD5	37 mg/L	30 mg/L	na	see Note 4		
9.	COD	40 mg/L	120 mg/L	na	see Note 8		

Notes:

1. Table 4.6: Irreducible Concentrations of [Effluent from] Sand and Organic Filters (source: Schueler, 1996), *Design of Stormwater Filtering Systems*, Claytor, Richard A., and Schueler, Thomas R., Center for Watershed Protection, Ellicott City, MD, (phone 410 461 8323), 1996.

2. Table 3.4: Median Effluent Concentrations from Stormwater Ponds and Wetlands, *National Pollutant Removal Performance Database for Stormwater Treatment Practices*, 2nd Edition, Winer, Rebecca, Center for Watershed Protection, Ellicott City, MD, (phone 410 461 8323), June 2000.

3. "...this permit does not include these relaxed limits. This is a general permit, designed to cover the widest possible range of facilities with similar wastewater characteristics. In effectively achieving this broad coverage, the permit must also be relatively simple. Therefore, some of the more individualistic or complex permit limitations are not included in this permit. The Division does not believe that there are a sufficiently large number of such facilities in Colorado to warrant including the exemptions in this general permit. If a permittee wishes to take advantage of these exemptions, the permittee must apply for an individual permit."

4. State of Washington Industrial Stormwater General Permit Section S3.D.2

5. Arithmetic Average of Total Copper effluent concentrations for 467 events (26 systems) where statistically significant treatment occurred from International Stormwater Best Management Practices (BMP) Database (IBMPDB) project web site (http://www.bmpdatabase.org/). See details in narrative.

6. Arithmetic Average of Total Suspended Solids effluent concentrations for 772 events (47 systems) where statistically significant treatment occurred from International Stormwater Best Management Practices (BMP) Database (IBMPDB) project web site (http://www.bmpdatabase.org/). See details in narrative.

7. Arithmetic Average of Total Zinc effluent concentrations for 571 events (39 systems) where statistically significant treatment occurred from International Stormwater Best Management Practices (BMP) Database (IBMPDB) project web site (http://www.bmpdatabase.org/). See details in narrative.

8. Arithmetic Average of Chemical Oxygen Demand effluent concentrations for 120 events (8 systems) where statistically significant treatment occurred from International Stormwater Best Management Practices (BMP) Database (IBMPDB) project web site (http://www.bmpdatabase.org/). See details in narrative.

9. Arithmetic Average of Total Lead effluent concentrations for 609 events (38 systems) where statistically significant treatment occurred from International Stormwater Best Management Practices (BMP) Database (IBMPDB) project web site (http://www.bmpdatabase.org/). See details in narrative.

10. CTR values for metals are hardness dependent and "dissolved" criteria concentrations. The values given for fresh water assume a hardness of 100 mg/L expressed as calcium carbonate.

11. 0.2mg/l is the Arithmetic Average of Total Phosphorus effluent concentrations for 477 events (20 systems) where statistically significant treatment occurred from International Stormwater Best Management Practices (BMP) Database (IBMPDB) project web site (http://www.bmpdatabase.org/). Less stringent standard recommended as initial effluent limitation. See details in narrative.

12. 2.0mg/l is the Arithmetic Average of Total Nitrogen effluent concentrations for 66 events (3 systems) where statistically significant treatment occurred from International Stormwater Best Management Practices (BMP) Database (IBMPDB) project web site (http://www.bmpdatabase.org/). Less stringent standard recommended as initial effluent limitation. See details in narrative.